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In connection with the recent paper by Fewkes in these pages upon the boring of sea urchins, the reader is referred to an article by G. John¹¹ in which it is maintained that the teeth form the chief boring apparatus, aided to a slight extent by the spines.

As has long been suspected the saccular diverticula of the starfish are not hepatic, but pancreatic in their function. Griffith and Johnstone¹² have studied them chemically, and find that the secretion is closely similar to that of the vertebrate pancreas.

Vertebrates.—Grieg¹³ gives a detailed description of *Lagenorhynchus albirostris*, with a plate, a copy of a photograph.

Dr. Shufeldt gives a review of the work done in the Anatomy of birds during the years 1888–89.¹⁴ The American workers are few, F. A. Lucas and Dr. Shufeldt being the only ones mentioned.

ENTOMOLOGY.¹

Myrmecophilous Insects.—Herr E. Wassmann continues his interesting investigations on the life of myrmecophilous beetles and their relations to the ants. He distinguishes: (1) true guests which are cared for and fed by the ants (*Atemeles*, *Somechusa*, *Claviger*); (2) forms which are tolerated but are not treated with special friendliness, and which feed on dead ants or rotting vegetable material (*Dinarda*, *Hæterius*, *Formicoxenus*, etc.); (3) ant-eating species, pursued as enemies, or only tolerated as a matter of necessity (*Myrmedonia*, *Quedius brevis*, etc.), to which may be added parasites like *Phora*. The three sets are not rigidly separable.

Atemeles and *Somechusa* have taken on some of the habits of their hosts, and are more adopted than other myrmecophilous insects. The best known species of *Atemeles* (*A. paradoxus* and *A. marginatus*) are found most frequently in the nests of *Myrmica*, more rarely in those of *Formica* and others. On the contrary, *A. pubicollis* seems to be more frequent in *Formica* nests. The species of *Atemeles* are lively animals,

¹¹ *Archiv für Naturgesch.*, lv.

¹² *Proc. Roy. Soc. Edinburgh*, xv.

¹³ *Bergens Museums Aarsberetning* for 1888 [1889.]

¹⁴ *Jour. Comp. Med. and Veterinary Archives*, 1890.

¹ This department is edited by Clarence M. Weed, Agricultural Experiment Station, Columbus, O.

constantly moving their feelers, and experimenting with everything. If one be attacked by a hostile ant, it first seeks to pacify its antagonist by antennary caresses, but if this is unavailing it emits a strong odor which appears to narcotize the ant. Wassmann describes how the ants feed the Ateomes, and are caressed and licked for their care; how one Ateomes feeds another, or even as a rarity one of the hosts. Yet the beetles feed independently on sweet things, dead insects, and even the unprotected young of the ants. The guests are licked and cleaned by the hosts, as well as *vice versa*; but the beetles are in reality quite dependent upon the ants.

As to *Somechusa*, it is represented in Central Europe by a single species, *S. strumosa*, which is almost always found with *Formica sanguinea*, though occasionally with other forms. This beetle is much larger, plumper, and more helpless than Ateomes; its odor is different and very like formic acid; its relations to the hosts are more passive, yet it can feed independently, for instance, on the larvæ and pupæ of the ants.

The other guests are rather pests than pets. They almost all live on animal food, are often protected simply by prestige or by their odor. The minute *Oligota*, *Homalota talpa*, *Myrmecoxenus*, *Monotoma*, *Histeridæ*, the small guest-ant *Formicoxenus* in the nests of *Formica rufa*, etc., appear to escape unnoticed.

On a change of abode, the myrmecophilus insects follow their guests, or, as in the case of *Somechusa* and Ateomes, they are taken with them by force. While the ants themselves are well known to be very exclusive, the guests can be shifted from nest to nest or even from species to species. As Wassmann says, the guests seem to have "international relations."

In commenting upon the above facts, Prof. Emery regards it as certain that the semi-domesticated, and in one sense parasitic, forms like Ateomes and *Somechusa*, are descended from thievish forms. They retain some of the original traits, just as dogs and cats do in their recently acquired tamed state.—*Journal Royal Microscopical Society*.

A New Harvest-Spider.—In a lot of material collected in Warren county, Ohio, during the summer of 1889, I find a single female specimen of an undescribed species of *Oligolophus*, a genus of Phalanginæ of which we have as yet recorded for the North American fauna but a single representative—*O. pictus* (Wood). This latter differs greatly from the one under consideration, for which the specific name

ohioensis is proposed, both in general appearance and structural details, as will be seen by comparing Fig. 2 of Plate——, which represents the structural characters of the new species, with Fig. 3 of the same plate, representing the structural details of *O. pictus*. The description is as follows:

Oligolophus ohioensis, n. sp. Plate, Fig. 1 and 2.

FEMALE.

Body 6 mm. long; 3.5 mm. wide. Legs: I., 8 mm.; II., 20 mm.; III., 15 mm.; IV., 10 mm.

Dorsum of a peculiar glossy gray, very different from that of any other harvest-spider I have seen. Central marking indistinct, shown mostly by stripes at outer margins: beginning at anterior lateral angles of cephalothorax two faint blackish stripes run obliquely back and toward the middle to the anterior border of the abdomen (forming a truncate V) and then run parallel to each other two-thirds of the distance to the posterior extremity, although they are nearly obsolete on the anterior third of the abdomen. Dorsum of cephalothorax free from tubercles except on margins, but having many minute brownish granules. Dorsum of abdomen with numerous very minute pits scattered over its entire surface; and an indistinct transverse row of small whitish tubercles, tipped with very minute dark spines, on each segment. Division between the cephalothorax and abdomen almost obsolete, and segmentation of anterior abdominal segments wholly so. Anterior margin of cephalothorax nearly straight; lateral angles slightly produced, each having a small black spine; three prominent, acute, grayish tubercles on middle of anterior margin, each tipped with a minute black spine, the middle one being twice as large as those on the side, and also slightly in front of them. Eye eminence prominent, constricted at base; grayish, except a dark spot about each eye; canaliculate, and having on each carina a row of four prominent conical, grayish tubercles, each terminating in a minute black spine; eyes small. Mandibles light brown, claws tipped with black; dorsal surface of second joint furnished short black hairs. Palpi mottled: ventral surface of femur with numerous white, elongate-conical tubercles, each tipped with a prominent black spine; dorsal surface furnished with numerous black spinose hairs, many of which are tipped with white. Patella short, with its inner lateral distal angle much prolonged (almost equalling the patella in length), the whole inner lateral surface being thickly set with strong spines, which are black tipped with white; a few smaller spines on its dorsal surface.

Tibia slightly longer than patella, its inner lateral distal angle slightly prolonged, and its inner lateral surface provided with spines like those on the patella; its dorsal and lateral surfaces also having smaller and sparser spines, and its ventral surface being provided with a few whitish conical tubercles tipped with black spines. Tarsus furnished with many rows of rather long, black, stiff hairs; and having two very small black tubercles at the base of the well-developed claw. Ventrum light gray, hispid. Legs very short, robust, pinkish: coxæ light gray with a slight pink tinge, provided with rather long stiff black hairs, on elevated whitish bases; trochanters tuberculate, light gray with a pink tinge; remaining joints pinkish, all except tarse having longitudinal rows of small black spines.

The pink legs, prolonged patella, and light gray color at once distinguish this species from *O. pictus*. CLARENCE M. WEED.

EXPLANATION OF PLATE.

FIG. 1. *Oligolophus ohioensis*, n. sp. Female. Natural size.

FIG. 2. Structural details of same magnified. *a*, Body; *b*, Eye eminence, side view; *c*, Eye eminence, front view; *d*, Palpus, side view; *e*, Claw of palpus.

FIG. 3. *Oligolophus pictus* (Wood). Male. Structural details magnified. *a*, Body; *b*, Eye eminence, side view; *c*, Eye eminence, front view; *d*, Palpus, side view; *e*, Claw of palpus; *f*, Claws of mandibles, side view; *g*, Genital organ.

Entomology in Illinois.—Two more volumes have lately been added to the valuable series of the Reports of the State Entomologists of Illinois. These are the Fifteenth and Sixteenth Reports, the first covering the years 1885 and 1886, and the latter 1887 and 1888. The late appearance of these volumes is due to a series of mishaps to which publications dependent on State printers are always liable, but which in this case have been peculiarly unfortunate; although Professor Forbes has gotten over the difficulty to a large extent, by the publication of the more important articles in bulletin form. These include the articles concerning arsenical poisons for the Codling Moth, and the life history of the Hessian fly of the Fifteenth Report, and the Studies on the Chinch Bug of the Sixteenth. Among the discussions now first published, the more important occur in the Sixteenth Report, and include the following subjects: The Corn Bill Bugs; The Meadow Maggots or Leather-Jackets; Notes on Cutworms; The Burrowing Web Worm; and an elaborate Economic Bibliography of the Chinch Bug, embracing the years 1785 to 1888, and covering 122 printed pages.

This report is illustrated by six magnificent Heliotype plates, made from drawings by Mrs. A. M. Westergren. Ten species of *Sphenophorus* and nine species of cut-worms are figured. It is needless to say that the character of these reports renders them indispensable to every working entomologist.—C. M. W.

Observations on the Plum Curculio.—In a paper read before the Iowa Academy of Sciences, and reported in the proceedings, Prof. C. P. Gillette concludes that the Plum Curculio is not wholly or even largely double-brooded, at Ames, Iowa. The following observations are recorded: Egg-laying began about May 25th, and practically ceased by the last of June. Eggs began to be deposited in considerable numbers about July 20th. Unhatched eggs were found constantly from July 22d to August 22d. The number of eggs laid after July 20th on trees, where counts were made, was over one-fifth as great as the number laid before that date. The beetles reared from early-stung plums began appearing in the breeding cages as early as July 22d. Beetles were seen pairing July 22d. The eggs of late punctures hatch as well as any, and the larvæ develop in the plums.

The Corn Root Louse.—In the fifteenth report of the State Entomologist of Illinois, Professor Forbes reports that the winter history of this species has been made out for the first time. "The eggs are collected from the ground in autumn by the common brown ant, *Lasius alienus*. Early in the spring, before corn is planted, the young lice, as they hatch, are placed on the roots of 'pigeon grass' (*Setaria*), smartweed (*Polygonum*), and possibly some other weeds, and are reared there until the field is planted to corn—if this be done—when they attack the corn-roots, or the subterranean part of the stem. If the field is planted to some other crop, the young lice mature on the grass-roots, and produce a second brood, many of which acquire wings about the middle of May, and then disperse. Later they seem to abandon the grasses entirely." In the sixteenth report of the same series, Professor Forbes speaks of this root louse as *Aphis maidis*? Fitch. The interrogation point apparently indicates a doubt in the author's mind as to the identity of the root and aerial forms of the *Aphis* infesting corn,—an identity which has been heretofore assumed by nearly all writers upon the subject, with very little reason for so doing.

The conclusions above quoted, which rest upon positive observations made in the field through several seasons, are entirely different from those reached by Mr. F. M. Webster, from observations largely of a

negative character, and recorded in the report of the United States Department of Agriculture for 1887 (p. 149), as follows: "These observations led me to conclude that the corn plant louse does not live over winter in the fields, nor are the eggs deposited about the corn in the fall, but that they are deposited about the roots of some other plant, most likely one of the grasses."

Our Injurious *Ægerians*.—In a paper with this title, recently read before the Columbus (Ohio) Horticultural Society, Professor D. S. Kellicott made the following introductory remarks, which are worthy of a wider circulation than they received in the journal of the Society in which the paper has been published in connection with the accompanying plate.

There is perhaps no family of Lepidoptera possessing more points of interest to the student than the *Ægeridæ*. It is separated from families placed next to it by hard and fast lines. The *Sphingidæ*, or hawk-moths, on one hand, are large, thick-bodied moths flying at twilight; their larvæ are foliage feeders, having a characteristic acute caudal horn on the last ring; whilst the *Ægerians* are all numbered among the small moths; their bodies are slender; they fly only by day, often in the brightest sunshine, in which many of them delight; their larvæ, so far as known, are borers; the caudal horn is absent, and in consequence of their mining habits their color is not variegated as is the case of larvæ of *Sphinges*. On the other hand, the family is as clearly distinct from the *Thyridæ* and *Zygenidæ*.

The unusual interest in the group then begins on account of its trenchant character; it is continued in view of the great beauty of the species, and beauty ought not to be ignored—it is not, even by the traditionally bloodless specialists; again, their natural history is full of suggestions, especially the remarkable protective mimicry exhibited by all or nearly all species. Moreover, many of the larvæ are harmful to farm and garden products, or to ornamental shrubs and trees; a few are real pests.

The *ægerian* moths are charming objects. Their graceful, delicate forms and rich coloration are scarcely surpassed by any of nature's countless objects of fine beauty. Steel-blue, red, orange, and golden are prevailing colors; several of these, always harmoniously blended, often constitute the ornamentation as well as the protection of a single individual.

Their close resemblance to insects of very different colors was observed long before the significance of protective mimicry was under-

stood. Nowhere among insects may be found better examples of this principle than in this group. The majority mimic bees and wasps, particularly the latter. We all know, and most insect-destroying animals know, that wasps hold out strong and pointed inducements for being left alone; surely the wide-spread knowledge of their armament, and their disposition to use it, prevents many rash attacks, and secures them practical immunity from a host of enemies. Now, the defenceless ægerians have, in some way, come to so closely resemble these batteries of potential energy and poison, that the practiced eye of the collector is often deceived; in consequence, these delicate moths, incapable of offense or defense except by flight, are allowed to pass without the destructive attention accorded to most conspicuous Lepidoptera by entomologically inclined birds and others.

This mimicry is more than a superficial resemblance; it is deeper and more substantial. Let us specify: first, the long, narrow wings, which are so often more or less hyaline and veined, are close imitations of those of the Hymenoptera; again, the steel-blue wings and bodies recall well-known wasps; third, the transversely marked or ringed bodies of many afford another mark of resemblance; fourth, when captured or disturbed, their sounds and attitudes are striking imitations of those of wasps; fifth, they fly about and rest on flowers in a manner quite similar to bees; and sixth, when captured some species at least give off the characteristic odor of the hornet.

It is scarcely possible that all these particulars are mere accidental coincidences, or that they are due to a common ancestry. It seems more rational to believe that the protection thus afforded gave direction to natural selection in the evolution of the present forms.

It was remarked above that ægerian larvæ are universally borers. But in the choice of food-plants there is the widest diversity; some bore through and devour solid woods as do the larvæ of the cossids; some prefer the pith of woody stems; others are found in the superficial woody layers; still others corrode the roots of plants, both woody and herbaceous, or herbaceous stems. These differences in taste, and the consequent variety of habits, suggest the interesting question of the duration of their larval period. The wood-boring larvæ of several species of Lepidoptera are known to require several years to reach maturity. For example: in June, 1885, I placed eggs of *Cossus robinæ* in wounds made in the bark of an unaffected common locust; the caterpillars hatching therefrom were seen to bore beneath the bark, and in June, 1888, at least one imago issued from the same place. I have strong evidence that *Hepialus argenteomaculatus* also

lives three years in the stems of *Alnus incana* and unmistakable proof that the ægerian which bores the pine tree has a similar period.

The number of North American species known to science has been remarkably increased of late. Of the one hundred and forty species, more or less. Mr. Henry Edwards has described a large majority during the last decade. Other species were made known by Harris, Walker, Westwood, Grote, and other well known specialists. The life history of comparatively few of these species is known. Dr. Harris, who did so much as a pioneer of American entomology, especially for its practical or economic application, published the first accounts of the natural history of these beautiful and destructive forms. Since his publications the details in the life of several others have been made known.

EXPLANATION OF PLATE XLIII.

The drawings from which the engravings were made were prepared by Miss Freda Detmers, of the Division of Entomology and Botany of the Ohio Agricultural Experiment Station. All the figures are twice natural size.

Fig. 1. Peach Tree Borer, *Sannina exitiosa*, male.

Fig. 2. Peach Tree Borer, *Sannina exitiosa*, female.

Fig. 3. Pear Tree Borer, *Egeria pyri*, male.

Fig. 4. Imported Currant Borer, *Egeria tipuliformis*, male.

Fig. 5. Maple Tree Borer, *Egeria acerni*, female.

Fig. 6. *Egeria lustrans*, male.

Fig. 7. Plum Tree Borer, *Egeria pictipes*, male.

Entomological News.—Mr. Wm. H. Ashmead is engaged upon a monograph of the Braconidæ of North America, which he hopes to complete before starting on a proposed trip to Europe. In a recent letter he states that he has recognized in the material on hand all the Försterian genera of the subfamily *Microgastrinæ*, and has three distinct species of the genus *Mirax*. . . . Mr. E. A. Schwarz has distributed his recent address as president of the Entomological Society of Washington. It is entitled "On the Coleoptera common to North America and other Countries." "The simultaneous occurrence of identical species in regions separated by wide stretches of ocean, or other great natural boundaries, can only be explained, 1st, by *Natural Dispersion*; or, 2d, by the *Agency of Man*. The author further divides the subject by including under the first heading "*a*, The circumpolar fauna; *b*, Species not belonging to the circumpolar fauna, probably of intratropical origin, which have spread into the temperate zone; *c*, Migratory species;" and under the second heading including "*d*, In-

tentional introductions; *e*, Non-intentional introductions; and *f*, Non-intentional importations. . . . A number of interesting entomological papers have lately been published in the Proceedings of the Iowa Academy of Sciences, by Professors Herbert Osborn and C. P. Gillette. . . . Professor A. J. Cook has published in a recent Bulletin of the Michigan Experiment Station an excellent discussion of insecticides. . . . Professor L. A. Forbes and his assistants have been engaged for some time in a study of the Aquatic life of Illinois; and the first of a series of papers upon the subject has lately been distributed from the Illinois State Laboratory of Natural History. It is a descriptive catalogue of the animals of the Mississippi Bottoms near Quincy, Illinois, by Prof. H. Garman, formerly of the Laboratory force, but now entomologist of the Kentucky Experiment Station.

Parasitic Castration of *Typlocybæ*.¹—M. A. Giard gives an account of his observations on the parasitic castration of *Typlocybe* by the hymenopterous larva *Aphelopus melaleucus*, and the dipterous larva *Ateleneura spuria*. Like their hosts these insects have two generations in a year. The researches of Mr. James Edwards show that what, in a previous note, M. Giard called *T. rosæ* L. should be distinguished into *T. hippocastani* J. Edw. and *T. douglasi* J. Edw. *Aphelopus* usually attacks the former and *Ateleneura* the latter. Parasitism by *Aphelopus* generally causes the ovipositor to be much reduced, and incapable of penetration, but *Ateleneura* seems to have much less influence. The penis, on parasitic castration, undergoes considerable reductions, and the specific character is greatly modified.—*Journal Royal Microscopical Society*.

SCIENTIFIC NEWS.

The Hayden gold medal for the advancement of geology, which is the gift of the widow of the late Prof. P. V. Hayden, has just been awarded by a committee of the Academy of Natural Sciences to Jas. Hall of Albany, N. Y. The Hayden medal fund amounts to \$2,500, and from the interest a medal valued at \$130 is to be presented annually to the person who has done the most during the year for the science which was Prof. Hayden's specialty. The award is in the hands of the Academy of Natural Sciences, and the committee consists of Profs. Frazer, Lesley, and Heilprin.

¹ Comptes Rendus, c. IX. (1889), pp. 708--710.